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The gemmae at maturity measure 0.5 mm. in diameter. The adult leaf measures 0.8 mm. in diameter. In *R. protensa*, a native of New Guinea and adjacent regions, the initial becomes covered with a greater quantity of gelatinous material than in *R. flaccida*. As the gemma increases in size it finally bursts through the gelatinous covering, which then clings to the base like a collar.

The gemmae of *Radula* are arranged in two groups according to complexity. In the first group the gemmae occur on margins of leaves, are irregular in outline when mature, and may be more than one cell thick; in the second they occur on the margin and surface of leaves, are regular in development and symmetrical in form, and are only one cell thick. *R. flaccida* and *R. protensa* belong to the second class.—W. J. G. LAND.

Cytology of Hymenomycetes.—LEVINE,[43] working in Harper's laboratory, has investigated the carpophores of 24 species of *Boletus* and of several species of *Polyporus*, has had in cultures the mycelia of various Hymenomycetes, and has secured some spore germination (none of the spores of *Boletus* germinated), so that his observations of the nuclear phenomena are somewhat extensive. The germinating spores of *Pholiota praecox* produce multinucleate germ tubes; in cultures 48 hours old the cells of the mycelium are multinucleate; but in cultures 3 days old, both uninucleate and binucleate cells are found. The mycelial cells of many species are binucleate, with clamp connections, etc. In the mature stipe of *Boletus granulatus* all the cells are multinucleate; while those of the ring, of the flesh and trama, and of the subhymenium are binucleate. At the end of the second division of the fusion nucleus in the basidium, the centrosomes become attached to the walls of the basidium and the 4 daughter nuclei remain connected with them by fibrillar strands. The centrosomes determine the points of origin of the 4 sterigmata and are carried up with the growth of the sterigmata and into the spores, pulling the nuclei into the spores. All the spores studied were uninucleate at first. The conclusion is that an alternation of generations "comparable to that in the Uredineae" is also present in these forms. "The sporophyte begins at some indefinite point in the mycelium and extends through the development of the carpophore."—J. M. C.

Aluminium salts.—FLURI[44] has claimed that aluminium salts render certain plant cells incapable of being plasmolyzed by ordinary plasmolytic agents by rendering the protoplasm highly permeable to these reagents. SZÜCS[45] finds that the protoplasm is rendered less permeable to many agents by aluminium salts, and that the incapacity for plasmolysis is due to a hardening of the protoplasm. The main evidence for the hardening of the protoplasm is the failure of chloroplasts to be displaced by a centrifugal force of about 1000 gravities, which ordinarily displaces them readily. This process of hardening is reversed (physicochemically and physiologically) by transferring the cells to aluminium-free solutions. The slow rate of reversing leads the author to postulate the tying up of the aluminium in an indiffusible form. It is only in moderate concentrations that aluminium salts produce the effect; in higher concentrations the protoplasm does not harden. Anthocyanin cells cannot be thus hardened, probably due to high sugar content. The author relates this to the fact that non-electrolytes hinder the precipitation of proteins by ions. He also thinks that aluminium salts are specific only in that their low toxicity enables them to bring about such a fundamental physical change in the protoplasm without killing it. While most salts produce such a change, it is not physiologically reversible.—WILLIAM CROCKER.

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[43] LEVINE, MICHAEL, Studies in the cytology of the Hymenomycetes, especially the Boleti. Bull. Torr. Bot. Club **40**:137–181. *pls. 4–8*. 1913.

[44] BOT. GAZ. **47**:252. 1909.

[45] SZÜCS, JOSEPH, Über einige characterische Wirkung des Aluminiumions auf das Protoplasma. Jahrb. Wiss. Bot. **52**:269–332. 1913.

Individuality of the chromosome.—A four-years' study of the vegetative and reproductive nuclei of *Carex aquatilis* has brought STOUT[46] to the conclusion that the chromosome is an individual organ, maintaining its identity through successive cell generations. He finds that even in resting nuclei the chromosomes are visible as definite bodies which can be counted, and that these chromosomes can be traced through all the stages of vegetative and reduction divisions, except synapsis. Spiremes are formed in both vegetative and reduction divisions, but even in the spirem the individual chromosomes are distinguishable. In the vegetative spirem there is no evidence of any splitting, the longitudinal splitting of the chromosome appearing only after the chromosomes have become arranged in the nuclear plate. In the metaphase of the heterotypic mitosis the chromosomes form a more or less obvious double spirem. The heterotypic mitosis separates whole chromosomes which have been previously paired. Although the study would have been more satisfactory if the stages in synapsis had been more complete, the results form an important addition to the already strong evidence that the chromosome is an individual organ. *Carex aquatilis*, like *Carex acuta* described by JUEL, forms only one pollen grain from a pollen mother cell, the other three aborting at an early stage.—CHARLES J. CHAMBERLAIN.

Seedling anatomy.—HILL and DEFRAINE[47] have worked long enough upon seedling anatomy to have come to some very interesting conclusions. Citing numerous facts that have been used in phylogenetic conclusions, they state that they "see no necessity for preserving seedling anatomy from the fate already meted out to other structural features which were at one time considered as

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[46] STOUT, A. B., The individuality of the chromosomes and their serial arrangement in *Carex aquatilis*. Archiv. Zellforschung **9**:114–140. *pls. 11, 12.* 1912.

[47] HILL, T. G., and DEFRAINE, E., A consideration of the facts relating to the structure of seedlings. Ann. Botany **27**:257–272. 1913.